RESEARCH PROGRAMS

OF THE

NATIONAL INSTITUTES OF HEALTH

blic Health Service Federal Security Agency

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The pages which follow represent an effort to compress into capsule form data which will introduce the reader to the basic medical research work of the Public Health Service, as carried on at the National Institutes of Health in Bethesda, Maryland.

The goal of medical research is the conquest of disease. Anyone who has lived in America for a few decades can testify through personal observation that many victories have already been won. Yet it is no accident, no mere "natural" progression, that we no longer fear diphtheria and typhoid fever and smallpox and plague and cholera; that maternal and infant deaths in childbirth have been materially reduced; that effective treatments exist for tuberculosis, pneumonia, influenza, rheumatic fever, and malaria; and that vaccines exist to protect us against a wide range of infectious diseases.

These and many other advances like them represent hard-won victories based upon research in which the Public Health Service has played an important part.

Public Health Service Research Increasingly Important

Public Health Service research and, indeed, much of organized American medical research, began only 65 short years ago when the new science of bacteriology was applied by a Public Health Service officer to the problem of cholera among immigrants arriving in this country. The scientist, a disciple of

Koch and Pasteur, established what was known as a Laboratory of Hygiene in the Marine Hospital at Stapleton on Staten Island, New York. Since then, research has assumed an increasingly important role in the activities of the Public Health Service.

Dr. Joseph A. Kinyoun's one-room laboratory on Staten Island has become--through a direct and unbroken line--the large and modern medical research center now located in Bethesda, Maryland. Its scientists have inherited a tradition marked by such notable accomplishments as the first demonstration of the cholera organism in this hemisphere; the discovery that pellagra is a dietary deficiency disease; the identification of tularemia in Utah in 1919; the development of the first effective vaccines against Rocky Mountain spotted fever, typhus, and mumps; the identification of new diseases of man such as lymphocytic choriomeningitis, rickettsialpox, and Louisiana pneumonitis; and major advances in the diagnosis, treatment, or prevention of diseases such as yellow fever, St. Louis encephalitis, liver cirrhosis, atypical pneumonia, epidemic conjunctivitis, Q fever, and brucellosis.

Each represents a major advance, contributing its part to the total health progress in America over a span of 50 years which saw life expectancy increased by 20 years and a parallel increase in the well-being of the Nation as a whole.

Chronic Diseases A Major Problem

Just before World War II, there was a pronounced trend toward more extensive study of the so-called chronic or long-term illnesses-- such as heart disease, cancer and mental disorders.

This arose in part because these conditions strike people in their middle and later years, and Americans were living longer.

It arose in part because many of the common infectious diseases were conquered (although such diseases as poliomyelitis, influenza and the common cold remained stubbornly resistant to new knowledge) and researchers could turn more of their attention to the vastly more complex chronic diseases. And it arose in part because there was at last recognition of the fact that the health of the Nation is directly and vitally related to its productive capacity and to its military strength.

National Institutes Expand

World War II provided an interesting and conclusive demonstration that fundamental research pays off--not only in nuclear energy and electronics, but in the medical and biological sciences as well. Since that war, Congress has given Federal recognition to public and professional interest in research in the chronic diseases by authorizing several new basic research programs at the National Institutes of Health.

To the National Cancer Institute (which was created in 1937) Congress added the National Heart Institute, the National Institute of Mental Health, the National Institute of Dental Research, the National Microbiological Institute, and last--in 1951--the National Institute of Arthritis and Metabolic Diseases and the National Institute of Neurological Diseases and Blindness.

In addition to research in its own laboratories, the Institutes are authorized by law to support investigations in

the Nation's medical schools, hospitals, and universities. They also help students complete their graduate training in research in the various scientific disciplines. About 70 percent of the total annual National Institutes of Health appropriation is expended outside the Public Health Service for these grants and fellowships.

Federal Grants Stimulate Research

At the center of this extramural program is the Division of Research Grants, which serves to coordinate the grant and fellowship activities of the Public Health Service, to provide a review and approval mechanism, and to administer those grants which do not fall logically within the scope of any of the Institutes.

Investigators who receive these grants are not subject to Federal Control or supervision. Most of the funds have gone to established investigators working in the larger institutions. However, the Public Health Service's policy has been also to help smaller institutions to expand or initiate medical research programs, in the belief that this will increase the total volume of good research and also add to the research potential of the Nation.

The research grants program has received widespread acceptance and cooperation from universities, medical schools and other non-Federal research institutions. Similar cooperation has been received from the various foundations and voluntary organizations interested in supporting medical research. Without doubt, this has been due in large measure to the wisdom

and the objectivity of the National Advisory Councils, established by law to assist the Public Health Service in administering the grants program.

Top Scientists Review Grants Applications

The law stipulates that grants may be approved for payment only upon recommendation of the appropriate Advisory Council. Because of the large volume of grant applications, and the need for highly specialized and time-consuming technical review for the guidance of the Councils, the Public Health Service has established a number of panels called Study Sections. These Study Sections, like the Advisory Councils, are composed largely of non-Federal experts in the various scientific disciplines necessarily involved in a program which covers the entire field of medical and related biological science.

Nearly 300 non-Federal physicians and scientists are serving on the 7 Advisory Councils and 19 Study Sections. At great sacrifice of personal interests, this contribution to the advancement of medicine and basic science is made by such men as Dr. Philip S. Hench of the Mayo Clinic, Nobel prize winner for his work in cortisone; Professor E. A. Doisy of the St. Louis University School of Medicine, Nobel prize winner for work in biochemistry; Dr. Paul D. White, the renowned cardiologist; Dr. Ernest E. Irons, former President of the American Medical Association; Dr. C. A. Elvehjem, Dean of the Graduate School at the University of Wisconsin; and Dr. Ward Darley of the University of Colorado Medical Center.

The Councils of the Study Sections not only bring to bear on the research grant program some of the best technical judgment in the Nation, but they also advise the Public Health Service on related matters.

Need for Coordinated Research Recognized

Research has changed in method as well as in direction. The Pasteurs and Kochs accomplished significant advances by using the skills which they themselves possessed, and with little help from other scientists. Today, the achievements that can be made by small groups of scientists are few. This does not mean that there are fewer worlds to conquer, nor does it mean that there is any smaller premium on the initiative and skill of the individual investigator. But today's researchers are dependent upon the work of scientists everywhere, working in dozens of scientific disciplines.

It isn't only that the disease entities are more complex (although certainly the studies aimed at understaning cancer, heart disease, and the neurological and metabolic disorders bring us close to the enigmas of the life processes themselves); it is also that scientific technology has become so vast that even a simple problem in medicine can best be attacked through the coordinated efforts of men skilled in a wide range of scientific disciplines.

In the early days of Public Health Service research, the laboratory served largely as an adjunct to observations

and analyses made at the bedside of the sick. Later, as the state of medical knowledge progressed, extensive fundamental laboratory studies formed the bulk of the Service's research program. By 1947, it had become apparent that clinical research facilities were needed.

It would have been wasteful of money and manpower to create separate research hospitals for the different diseases, because it had become increasingly apparent that clinical investigaters not only should be placed in immediate proximity to basic laboratory investigations in the same field, but close to clinical and laboratory research in other diseases as well since the different diseases and body systems were proving to be far more closely related than had been suspected.

Congress Approves Unique Research Center

The Public Health Service therefore asked Congress in 1947 for funds to contruct a research center for coordinated laboratory and clinical investigation. The Congress voted unanimously in favor of such a structure. It was begun in 1949, after two years of planning and design. In the Spring of 1953, the first patients whose types of illness are being studied in the various Institutes will be admitted to the Clinical Center.

The building is a 14 story brick structure, providing bed space for 500 patients, with clinical and basic laboratory space adjoining in a ratio of two square feet of lab space to

every square foot of patient space. The whole plan was drawn with the specific intent of permitting laboratory investigators and clinicians to work in close proximity, as well as providing the utility and flexibility to meet the ever changing requirements of laboratory research, patient care, and sound administrative practices.

Today's Diseases Are Baffling, Complex

The National Institutes of Health, then, consists of the seven research Institutes, the Division of Research Grants, and the Clinical Center. Its programs reflect the baffling array of chronic and disabling diseases that in themselves are responsible for constant increases in the costs of medical care and decreases in productive working hours.

At no time in history has research against disease been of more importance to the economic life of our country; at no time has the positive health of our society been more necessary to its security against aggression; and at no time has it been so essential that there be a true partnership of Federal, State and local agencies, voluntary organizations, and practicing physicians to bring better health to more people.

Hope for progress lies in the continuity and strength that can be given to the basic and clinical research work of the Nation--a work in which the National Institutes of Health is an important factor.

Highlights on each of the seven Institutes follow:

NATIONAL HEART INSTITUTE

In the early summer of 1948, the 80th Congress unanimously passed and the President signed the National Heart Act (Public Law 655). The Act established the National Heart Institute in the Public Health Service, as one of the National Institutes of Health at Bethesda, Maryland. Its function is to conduct and support research and training in diseases of the heart and circulation and to aid the States in the development of community programs for the control of these diseases.

Bipartisan sponsorship introduced and endorsed the legislation, and during the course of its consideration many members of both parties in both Houses of Congress supported and urged its passage. Congressional hearings, moreover, reflected the nationwide interest and desire for action to provide for research and a Federal program against diseases of the heart and circulation, the major causes of death in the United States.

Leaders in medicine, research, business, industry, labor and the national voluntary organization in the heart field, the American Heart Association, strongly recommended such a program.

Strong Support Given Heart Institute

The National Heart Institute program is administered as the Federal government's share in a national collaborative undertaking against heart disease, joining the partnership

of interests in the cardiovascular field. The wholehearted support of the American Heart Association for the Institute was expressed in 1949 by the Association's president at that time, Doctor H. M. Marvin, who said:

"This marks the beginning of an ideal arrangement which has long been the cherished dream of many students of public health - a strong government body and a vigorous voluntary agency working hand in hand towards the same goal. The two agencies will supplement and complement each other, and it is the belief of those now directing them that the entire field of cardio-vascular disease can soon be adequately covered through close and constant cooperation."

In 1950, Dr. Marvin's successor, Dr. Tinsley Harrison said:

"It is our feeling that this represents the kind of activity which is best seen in democracy, a private movement and a Federal movement aiding and supplementing each other in a cooperative way with thoroughly good teamwork."

In 1952, Dr. Louis Katz, AHA president for that year, also spoke of the friendly relationship and mutual support existing between the Heart Institute and his association when he observed that, "The relationship is one of full cooperation, extending far beyond the expression of formal statements."

In the four years since the establishment of the National Heart Institute, these and other medical leaders of the American Heart Association, such as Doctor Paul D. White, Doctor T.

Duckett Jones, and Doctor Irving Wright have presented to the Congress and to the public their continuing endorsement of the National Heart Institute's program and the funds appropriated for it by Congress.

Significant Gains Through Grants

The major part of the annual heart appropriation goes for grants to non-Federal institutions and scientists; to States for research, for training, and for development of local heart programs. The remainder is employed for direct operations, chiefly research, at the National Heart Institute. Research is conducted by the Institute to increase basic and clinical knowledge of the underlying disease processes affecting the heart and circulation.

Significant advances have been made, including new or improved therapeutic agents (such as procaine amide, a drug used widely to abolish or prevent the fatal irregular heart rhythms which frequently follow coronary attacks.) A major step has been taken in the development of knowledge of atherosclerosis, the breaking down of the complex system by which the body handles fats into component parts capable of isolation and purification. The later finding opens the possibility of a routine blood test to detect early hardening of the arteries and at the same time provide physicians with a blueprint for counteracting defects in blood that cause the condition.

Cardiovascular Research Intensified

Through its research grants program the National Heart Institute stimulates new and intensified interest in cardiovascular research and contributes to the expansion of heart research by enabling scientists at universities and other non-Federal institutions to undertake many projects for which institutional funds are not adequate. Advances have been made and continue to be made by scientists receiving grants support on a wide laboratory and clinical research front in the cardiovascular field. Some 500 current research projects testify to the active prosecution of heart research made possible by this program.

Other funds from the National Heart Institute appropriation go into the development of research personnel; the improvement of cardiovascular teaching in the medical schools; the raising of the level of competence of physicians in general practice through postgraduate clinical training; and the development of public health heart programs through formula grants-in-aid and technical assistance to the States. In each of these areas steady progress is being made.

Public Favors More Research Funds

How the public views the needs of this problem was indicated in a poll conducted by the American Institute of Public Opinion, at Princeton, N. J., June 26, 1948. Seventy-nine percent of the people questioned were in favor of large government appropriations to the National Heart Institute for research to discover the causes of and cure for heart and circulatory diseases. The survey also showed that 80

per cent were willing to pay more taxes to support this type of research.

In 1951, a reflection of public interest in the Federal heart program was voiced by a member of the Senate, as follows:

"Citizens feel that this money is being used well. They feel that the appropriations which have been made, being used well by the Federal Government, have gone into the hands or have been placed under the control of organizations and persons who are scientists, who are vitally concerned with getting the most out of every dollar."

In its first fiscal year, 1949, the National Heart Institute was financed from the main NIH appropriation. Subsequent Congressional appropriations to the Heart Institute have been as follows: Fiscal Year 1950, $10,725,000; 1951, $14,750,000; 1952, $10,000,000; 1953, $12,000,000.

Clinical Center to Further Heart Research

The major portion of these appropriations is for research, the most important facet of the National Heart Institute's program. Research holds this paramount position because the greatest achievements against heart disease can be won only through research by the finding, interpretation and application of new knowledge of the underlying causes, prevention, and cure of the major heart ailments.

The National Heart Institute shares in the significant national opportunity for co-ordinated research possible with the new Clinical Center. The kind of research which may be

carried on as a part of the Heart Institute's program in the Clinical Center may be illustrated by a hypothetical example, such as a long-term study of hypertension with two main objectives: to observe the natural history of high blood pressure, and to find better therapeutic agents or procedures.

Admissions Policy Well Defined

A study like this would require frequent admissions for treatment and observations of the individual over a period of several years. Therefore, in contrast to many other studies (for which patients might be referred from various parts of the country) clinical material is drawn from families established fairly permanently in areas close to the Clinical Center. For example, criteria set by the principal investigator for this study might include a request for active males between ages 30-40, normal in every way except for early symptoms of hypertension.

Letters describing the study and the admission criteria are written to the deans of medical schools, hospital directors and individual cardiologists. In this way perhaps 50 patients might become participants in the study, with their first admissions to the Center staggered over a 6 month period.

At first admission each patient receives a complete diagnostic examination. Thereafter at regular intervals, perhaps every 6 months, patients will be readmitted for observation or therapy. This might occur on a Friday night with a discharge on Sunday night, so as not to interfere with the patient's normal work routine. Half of these patients might

receive one of the new drugs such as veratrum alkaloids, which have the capacity to lower blood pressure without reducing cardiac output. The other half might be treated with a sound and practical form of psychotherapy--also believed to reduce blood pressure. Long-term results of the two regimens would be observed and compared.

Institutes to Collaborate on Research

The psychiatric studies and treatment are given through arrangements with the National Institute of Mental Health. Regular psychiatric and psychological examinations are also given to all patients as a part of the study of the natural history of hypertension. Clues might thus be obtained to the old problem of which came first: hypertensive disease or the hypertensive personality? Conceivably, one might try to define the basic hypertensive personality and attempt by therapy to modify it. It should also be possible by these means to detect and evaluate the general physiological impact of serious emotional disturbance.

Similar collaborative studies might be arranged with the Institute of Arthritis and Metabolic Diseases in order to obtain information on the interrelationships between metabolic patterns, obesity, hypertension and abnormal psychological states.

Private Physicians Role Recognized

In all studies, full reports on each patient will be given at suitable intervals to the referring physician or institution, and the receipt of similar pertinent reports will be welcomed. Active collaboration between the patient's

own physician and the Clinical Center staff is essential for interim therapy and observation. Referring physicians are invited to confer with the appropriate staff members and consultants.

Real Hope for Heart Disease Achievements

In the field of cardiovascular diseases, research today represents a rapidly advancing range of progress through a collaborative Nation-wide effort, in which the National Heart Institute has a significant place. There is real hope for great conquest of the heart diseases. As Doctor Edgar V. Allen, a leading research authority of the Mayo Clinic Foundation, says:

"I can find no logical reason to believe that any important cardiovascular disease cannot be largely or wholly vanquished. If the conquest of these diseases continues at the rate which characterized the fifteen years just past, within the lifetime of physicians now living there will be no cardiovascular disease which cannot be prevented or corrected."

THE NATIONAL CANCER INSTITUTE

The National Cancer Institute and a National Advisory Cancer Council were created by an act of Congress known as the National Cancer Institute Act, signed by the President on August 5, 1937. This law was the result of growing concern over the Nation's cancer problem. Cancer had become and still is the second highest cause of death from disease in the United States, taking a toll of over 200,000 lives each year. It was recognized that a broad sustained attack on the disease was called for if progress were to be made against it, and for such an attack assistance from the Federal government was needed.

A new law, known as the Public Health Service Act, and enacted in 1944, repealed all previous legislation concerning the Public Health Service, including the National Cancer Institute Act, and consolidated into one law, with some revisions and additions, the provisions of the earlier laws. The 1944 law has now been amended several times.

Although the provisions of the National Cancer Institute Act have been changed somewhat by this subsequent legislation, the powers and duties of the Surgeon General of the Public Health Service with respect to cancer remain substantially the same as provided in the original Act. The chief effects of the later legislation were to change the administrative position of the Institute from a division in the Public Health Service to one of the Institutes composing the National

Institutes of Health, and to add six individuals who might be lay members outstanding in public affairs to the National Advisory Cancer Council.

Cancer Control A Long-Time Job

The legislation establishing the National Cancer Institute received the endorsement of prominent physicians and scientists who recognized that the solution of the cancer problem was a long-time job which required a sustained and comprehensive program of research, and that the large sums of money required for such a program could be assured only by governmental appropriations. This continued public support is evidenced annually by scientists and laymen who appear before the Appropriations Committees of the House and Senate to testify in favor of the Institute's appropriations.

The Institute's appropriations, which started at $400,000 in 1937, had grown to $19½ million by 1952, dropping off slightly to almost $18 million in 1953.

From the time of its establishment, the Cancer Institute has maintained close liaison with the American Cancer Society, the sole non-governmental cancer organization with a nation-wide program. The executive director of this organization was one of the members of the first National Advisory Cancer Council, and many other officers of the Society have served on the Council or as members of Institute advisory committees since that time. Members of the staff of the National Cancer Institute serve on the Society's board of directors and on its committees. The Society and the Institute from time to time

engage in joint projects such as the sponsorship of National Cancer meetings and the production of educational materials.

Causes over 200,000 Deaths Annually

Public interest in cancer is probably greater than in any other disease. Not only does it cause over 200,000 deaths annually, but the nature of the disease and its inexorable course, once it has progressed beyond the curable stage, is a particular source of grief to the families and friends of its victims. This interest in cancer is evidenced by numerous facts among which these are noteworthy:

1. When the bill providing for the establishment of the National Cancer Institute was introduced, it was signed by every member of the United States Senate except two who were absent and these two later asked to have their names added.
2. The amounts voluntarily subscribed by the public for cancer research and other activities conducted by the American Cancer Society since 1946 have ranged from 10 to 15 million dollars per year. Thousands of persons, including leading scientists, physicians, and leaders in business and public affairs, give their time without pay to the work of this Society.
3. Two Gallup polls taken about 5 years apart (1946 and 1951) showed that more than 80 percent of the people interviewed were in favor of the government

spending large sums for research on cancer, and over 70 percent of those polled indicated their willingness to pay more taxes in order to supply the money.

Extensive Research Into Problem

The program of the National Cancer Institute has for its objectives the securing of new knowledge about cancer and the dissemination and application of the knowledge we already have about this disease. Briefly the activities include the following: (1) An extensive research program in the Cancer Institute and cooperating laboratories and hospitals in which cancer problems are approached from practically every scientific angle; (2) a grant-in-aid program to support research in non-Federal institutions, a program that enlists the services of hundreds of scientists in the field of cancer research; (3) a grant-in-aid program to support special projects in the field of cancer control such as studies of epidemiological and environmental cancer, evaluation of cancer diagnostic tests, cancer morbidity surveys, tumor registries, case finding services, training in the use of cancer diagnostic tools, production of educational films, educational programs for physicians, nurses, and public health workers.

(4) A grant-in-aid program to coordinate and improve the teaching of cancer to undergraduate students in schools of medicine and dentistry; (5) a grant-in-aid program to help finance official State cancer control programs; (6) a research

fellowship program to provide training in the techniques of cancer research for young scientists; (7) a traineeship program to provide specialized graduate training in cancer diagnosis and treatment for young physicians who wish to specialize in this field of medicine.

(8) Loans of radium to hospitals for use in cancer therapy and research; (9) cancer nursing activities to help improve the education of the nurse in cancer and to provide better public health and bedside nursing services for the cancer patient; (10) studies of cancer morbidity, environmental cancer, cytologic techniques, diagnostic tests, case finding methods, and epidemiologic data; (11) publication of the Journal of the National Cancer Institute, a scientific publication containing reports of cancer research; and (12) the publication of scientific monographs for the use of scientists, and of handbooks, source books, and educational materials for the use of professional and lay groups carrying on cancer control activities.

Research Findings Tested Promptly

The new Clinical Center at the National Institutes of Health is providing the National Cancer Institute with much needed clinical facilities, making it possible to expand its clinical research program and to bring into the Institute's own facilities clinical research which it has been carrying on through cooperative arrangements at outside institutions.

The Institute endeavors to maintain a well-balanced program at all times both in research and in cancer control

activities. When analysis shows that insufficient emphasis is being placed upon an area of research which it is believed should be expanded, efforts are made to increase research in that area. As new knowledge becomes available, new research is undertaken in line with this new knowledge.

In the field of cancer control the basic needs are well known and those techniques or programs are developed which show promise of aiding in the cancer control program. These are studied and evaluated, and the results are made available for the guidance of cancer control workers.

FUNCTIONS OF NATIONAL INSTITUTE OF MENTAL HEALTH

The National Institute of Mental Health was established by Congress to attack the growing problem of mental illness. The extent of this problem was brought into focus in World War II, when some million and a half men were either rejected by draft boards or discharged from the Armed Services for mental or emotional disabilities. Over 500,000 persons were being cared for in public mental institutions at a cost to the taxpayer of a half-billion dollars a year. It was estimated that the total number of Americans with some type of mental or emotional illness might be as high at 9 million.

In 1946, Congress passed the National Mental Health Act, which created the National Institute of Mental Health to administer Federal aid to research, training, and community programs in mental health. Like the Heart and Cancer Institutes, the Mental Health Institute became a component of the National Institutes of Health. To assist the Institute in determining the apportionment of Federal funds for training and research, and to advise on general policy matters, the law provided for a National Advisory Mental Health Council. Its membership is drawn from outside the Federal government, half from the mental health professions and half from the general public.

Backed By Many Organizations

The Institute works closely with citizen groups, as well as State and Federal agencies, on problems of mental health. Evidence of the interest of both public and professional

groups was seen in the original hearings on the National Mental Health Act before Congress, and in the annual appropriations hearings.

Among organizations backing this program in mental health, or requesting one even more comprehensive in scope, have been: the National Mental Health Committee, to which 39 State governors belong; the National Association for Mental Health, the American Psychiatric Association, the American Legion, General Federation of Women's Clubs, National Congress of Parents and Teachers, and the Federal Council of the Churches of Christ in America.

Within the Federal Security Agency, the Institute plans joint activities with the Children's Bureau, Office of Education, the Office of Vocational Rehabilitation, and units of the Public Health Service. With the National Association for Mental Health, it shares the sponsorship of National Mental Health Week, and joins in other educational activities.

For operations in the fiscal year 1948, Congress appropriated a total of $4,250,000 for the Mental Health activities. In 1949, the Institute asked for $4,524,000, This figure was raised by the Bureau of the Budget to $4,615,000, and by Congress to $9,028,000. Among those who testified in favor of increasing the Institute's appropriation, and who especially stressed the need for more research and training, were Dr. William C. Menninger, of Topeka, Kansas; Dr. Frank Fremont-Smith, of the Josiah Macy, Jr., Foundation; and Dr. George S. Stevenson, medical director of the National Committee for Mental Hygiene.

Appropriations Progressively Increased

In 1950, the Congress again increased the Mental Health appropriation to $11,012,000. In 1951, the National Committee for Mental Hygiene recommended a larger appropriation for the Institute, feeling that the new program had demonstrated its ability to fill in some of the gaps in the Nation's mental health structure. In 1951, the importance of having a good mental health program as part of the general civil defense effort was stressed by several witnesses before the appropriations sub-committee, including Mrs. Anna M. Rosenberg, Assistant Secretary for Defense, and the appropriation passed by Congress amounted to $10,519,000. For the fiscal year 1953, the Institute was given $10,895,000, the full amount approved by the Bureau of the Budget.

The three principal objectives of the National Institute of Mental Health are: (1) expanding community mental health programs; (2) training more personnel for practice, research, and teaching responsibilities; and (3) gathering more knowledge about mental illness through research.

State Aid Exceeds Federal

Aid to community mental health programs is given through consultation and Federal grants-in-aid to the States. Under provisions of the National Mental Health Act, the allotments to States are determined by population, per capita income, and extent of mental health problems. For each dollar of Federal grant-in-aid funds, the State must contribute 50 cents from State, community, and private sources. Actually,

in fiscal 1952, the States were budgeting $2.70 for each Federal dollar in the mental health field. Although no Federal funds may be used to support institutional care, wide range is given to the States in the use of these grants.

An important use of these funds is the establishment of community clinics, to help meet the need for treatment services and to act as centers for community education programs. In 1951, 331 such clinics were supported, in part, by grant-in-aid funds. These grants also enable the States to support conferences or seminars, where members of such professions as public health, teaching, ministry, law, and social work may learn more about mental health concepts as a practical aid to their jobs of dealing with people and their emotional problems. Some States use their funds to help provide mental health personnel for schools and other public agencies, to operate educational services for private physicians, and to provide information for allied professions and the general public in the form of films, pamphlets, radio and television programs, and monthly bulletins.

As part of its community services program, the National Institute of Mental Health, upon the request of any State, makes surveys of State hospitals and other mental health services. The Institute has been active in bringing to the attention of the States a model commitment law, in helping to make mental hospitals more accessible to the mentally ill and in removing humiliating factors involved in hospitalization.

Training Grants and Awards Offered

To develop personnel who will be more skilled in mental health concepts and techniques, the National Institute of Mental Health makes training grants available both to institutions and individuals. Priority is given to grants to expand the facilities of training schools for educating more psychiatrists, clinical psychologists, psychiatric social workers, and mental health nurses. As a further means of training needed personnel, stipends are awarded to individual graduate students selected by training schools.

Since 1949, grants have also been made to medical schools, so that undergraduate students - the Nation's future doctors - might receive more basic orientation in mental health practices. Grants have also been made to the four leading professional bodies in mental health, so that they might hold conferences to determine means of improving training methods and curricula.

Under the Institute's research program, new knowledge about mental health is sought through grants to independent research projects outside the Government, fellowships to scientists who seek further research training, and studies in the Institute's own laboratories and in cooperation with other research agencies, both public and private.

Under the research grants program, aid is given to projects recommended by the National Advisory Mental Health Council as being the most promising of those submitted for

consideration by outstanding scientists in universities, hospitals, and laboratories throughout the country. Since the unknown areas in mental health are so broad, projects being supported reflect many methods of approach. Causes and treatment for schizophrenia and other mental illnesses offer a wide field of exploration. So do neurophysiology, endocrinology, child development, psychosomatic illnesses, and group behavior. Special grants are sometimes made to groups or institutions especially qualified to investigate areas of interest to the Institute, such as drug addiction and alcoholism.

To help develop more investigators skilled in mental health research, the Institute awards fellowships for advanced training in psychiatry, biochemistry, social science, and related disciplines.

Institute Conducts Own Studies

In addition to grants to non-Federal research projects, the Institute conducts studies in its own laboratories. Now being studied are the relation of the brain to convulsive disorders, the function of the adrenal gland in relation to schizophrenia, and the basic nature and location of the inhibiting process in the nervous system. At Lexington, Kentucky, investigations are made of the addictability of various narcotics, as well as the general problems of addiction.

Clinical research will be made possible and laboratory research greatly expanded at the new Clinical Center. Of the

500 beds in the Center, 98 are allotted to the treatment of mental and nervous cases, while approximately 22,500 additional square feet are devoted to laboratory space.

Mental Health Research Still Inadequate

The research program of the National Institute of Mental Health has brought the study of mental illness to an all-time high in this country. However, research in this field is still inadequate, compared with other kinds of medical research. It is estimated that for every dollar invested in medical studies, only 5 cents goes to the study of mental illness, although the mentally ill occupy half the Nation's hospital beds.

One great need in developing the public health phases of mentalhealth is to work out protections aginst mental illness comparable to those protections already developed against physical illness. Such measures might include mass screening measures which would detect mental illness at an early stage. Practical methods might be worked out to build up individual resistance to mental illness. Likewise, treatment methods must be devised that are less costly and time-consuming than those now in use. Funds spent on further research, training, and community services in mental health will lead to deductions in the cost of maintaining patients in mental hospitals and in reducing the incalculable costs of lost production and lost wages.

ARTHRITIS AND METABOLIC DISEASES

In 1948 and 1949, two events served to focus the attention of Congress and the public upon the problem of arthritis. In 1948 a nonprofit, fund-raising agency, the Arthritis and Rheumatism Foundation, was established and organized on a national basis by outstanding rheumatologists and interested citizens. Fund-raising for research, treatment, and education in rheumatic disease was initiated on a Nation-wide scale.

Next came the important discovery that cortisone, a hormone from the adrenal gland, would dramatically relieve some forms of arthritis, hitherto not associated in the minds of physicians with the metabolic system. ACTH, a pituitary hormone, was found to produce similar effects. Thus new avenues of approach, more promising than any previously opened against rheumatic disease, were available to medical research. The scientists at Mayo Clinic who made the discoveries received the 1949 Nobel prize for medicine.

These facts were prominent when the 81st Congress in 1950 considered various bills proposing additions to the National Institutes of Health, principal research arm of the Public Health Service. It was emphasized that there was great need and unprecedented opportunity for an Institute organized to study arthritis, and the urgent public health problem of rheumatic disease was discussed.

6,500,000 Americans Suffer

The data presented at that time have been corroborated in a recent study by the Public Health Service and the Bureau of the Census. From a survey of 25,000 households, it was estimated that 6½ million Americans have been told by a doctor that they have arthritis or rheumatism, supporting the previous conservative but staggering estimate that 7 to 8 million people in this country suffer from rheumatic disease. The annual cost to the Nation is 97 million work-days and more than a billion dollars in medical expenses, relief, and lost wages.

Yet in 1949, only $300,000 was spent on research in this field.

Congress Authorizes New Institute

As a step toward rectifying this inadequacy, the 81st Congress, on August 15, 1950, passed the "Omnibus Medical Research Act," Public Law 692, authorizing, among other things, the establishment of the National Institute of Arthritis and Metabolic Diseases within the Public Health Service. In addition to rheumatic disease, the Institute was to study various conditions related to arthritis by virtue of their common denominator, metabolism, or body chemistry, as it is called in non-technical language. These conditions include diabetes, goiter, nutritional deficiency, liver diseases, peptic ulcer, anemia, allergy, radiation injury, shock, and other prevalent public health problems. Diabetes alone afflicts a million Americans.

Happily, the cooperation between NIAMD and non-Federal groups interested in arthritis and the metabolic diseases has been strong and constant. The Arthritis and Rheumatism Foundation has commended the Institute in Congressional hearings and educational campaigns. Liaison has been established with professional societies like the American Rheumatism Association and the American Diabetes Association. Moreover, a productive exchange of information exists between the Institute and its research grantees in universities, hospitals, and other non-Federal institutions.

$7,000,000 Minimum Expenditure Urged

In the hearings prior to authorization of the Institute, several citizens, including the Chairman of the Arthritis and Rheumatism Foundation, urged a minimum annual expenditure of $7 million, representing a dollar a year for each arthritis sufferer.

No new funds were appropriated at the time the Institute was authorized, the Institute having absorbed the staff, facilities, and budget of the former Experimental Biology and Medicine Institute, which was abolished when the Surgeon General established the NIAMD on November 22, 1950. The National Institutes of Health submitted to the Bureau of the Budget a request for a supplemental appropriation to activate new research in the specific field of arthritis and metabolic diseases, and the Bureau of the Budget approved $1,225,000 for this purpose.

Early Appropriation Requests Fail to Pass

On September 8, 1950, the Senate Committee on Appropriations heard NIH representatives present a justification for $3 million to activate the new Institute of Arthritis and Metabolic Diseases and the other new research program, Neurological Diseases and Blindness. It was pointed out that 33 institutions in 16 states had requested nearly $2½ million in grants for research on arthritis and metabolic diseases alone. The Senate approved a $3 million appropriation, but the action was not confirmed by the Conference Committee.

On December 15, 1950, an amendment earnestly pleading the cause of the new Institute and requesting $2,625,000, was placed before the House. It was rejected, however, in view of pressing needs imposed by the Korean situation.

For the fiscal year 1952, the Bureau of the Budget approved and the Congress appropriated $3,261,900 for the work of the Institute.

Prominent Officials Ask Support

Two letters stressing the need for appropriate action were submitted at the House hearings on February 27, 1951. Mr. Stuart Symington wrote that "this work would be of real benefit to the American people"; and General Lucius Clay and Mr. Sidney Weinberg, officers of the Arthritis and Rheumatism Foundation, wrote that they believed "immense results in terms of effectiveness and happiness of the people will result from the research and aid made possible by an appropriation."

Similar comments were made by citizens at the House hearings of March 5, 1951, and again the seriousness of the arthritis problem was expressed. Former Congressman Frank Keefe of Wisconsin stated, "As I have studied the details of this budget, I think they have a pretty well-rounded program ....my hope is that it will not be reduced, but that we can maintain it as it has come before the Congress."

At the Senate hearings on May 11, 1951, speaking on behalf of NIAMD were Dr. Gideon de Forest, Medical Director of the Arthritis and Rheumatism Foundation; Mr. Floyd Odlum, Chairman of the Foundation; and Mr. Edward A. Pierce, senior partner in an investment banking house. The Congress subsequently authorized an appropriation of $3,341,400, a slight increase over the previous year's appropriation.

Program Nucleus Established

The pattern for Fiscal Year 1953 was similar; the Bureau allowed $3,578,400, and that full amount--$3,578,400--was appropriated by the Congress. The small increase over the previous year's appropriation provided for a beginning in clinical investigations and for statutory salary advances.

The Institute's attack on various health problems has gone forward, both in the laboratories at Bethesda, Md., and through productive research grants and fellowships. The National Advisory Arthritis and Metabolic Diseases Council, an advisory group composed of leaders in this field, meets three times a year at the Institute to recommend grants for

approval by the Surgeon General. The framework for a full-scale program against arthritis and metabolic diseases has been organized and an effective functioning mechanism established.

Important Clues Developed

Significant progress has been made in several areas. For example, safer cortisone dosage schedules have been worked out, often permitting prolonged treatment of arthritis without harmful side effects. New vitamins have been discovered and isolated, and methods have been developed for determining the nutritional status of individuals and groups. Important clues have been found to the prevention of death from radiation and shock. A new technique has emerged for treating osteoporosis, a brittle bone disease of the aged. And important discoveries have been made concerning progressive muscular dystrophy of children, peptic ulcer, chronic gout, and other conditions.

In the Clinical Center, NIAMD will broaden the scope of its intramural activities to include direct observations on patients. Seventy-eight beds have been allocated to this Institute, of which approximately twenty-five will be devoted to the study of rheumatic disease. This unique facility permits combined treatment and study of patients with arthritis, endocrine diseases, diabetes, and various other metabolic disorders. Essential basic knowledge of body processes may be expected to result from research on nutrition requirements, reaction to stress, and energy expenditure.

NATIONAL MICROBIOLOGICAL INSTITUTE

Although the National Microbiological Institute was not established officially under its present name until 1948, its program of research on the infectious diseases reaches back to the very beginning of the National Institutes of Health. For many years the investigations of Dr. Kinyoun and his successors represented the major research activities of the Public Health Service. From this work came a number of notable achievements, including a successful treatment for whooping cough, a typhus vaccine, Rocky Mountain spotted fever vaccine, elimination of the paralytic factor from rabies vaccine, and the discovery that the rat flea is the vector of endemic typhus.

In the broad field of microbiology, there is no over-all voluntary organization with which the Microbiological Institute cooperates in carrying out its present responsibilities. In this respect it differs from the Cancer Institute, for example, which maintains close liaison with the American Cancer Society; or the Heart Institute, which cooperates in its program with the American Heart Association. However, very close collaboration exists with such organizations as the National Foundation for Infantile Paralysis, the World Health Organization, American Society of Tropical Medicine, and the American Public Health Association.

NMI appropriations for research, which were $2,209,605 in 1948, rose to $3,347,150 in 1953, exclusive of $2,100,000

for research grants.

Range Of Activities Extensive

The research program of the National Microbiological Institute is carried out through four principal laboratories. In the Laboratory of Infectious Diseases, scientists are studying such diseases as influenza, poliomyelitis, tuberculosis, brucellosis, and the rickettsial diseases. In the Laboratory of Tropical Diseases, much work centers on the parasitic diseases that afflict hundreds of millions of people in tropical countries--malaria, sleeping sickness, schistosomiasis, and filariasis.

In the Laboratory of Biologics Control, all vaccines, toxins, antitoxins, and other biological products manufactured by licensed pharmaceutical houses are tested for purity, safety, and potency. In addition to carrying out the provisions of the Biologics Control Law, this laboratory also conducts research aimed at developing and improving biological products. At Hamilton, Montana, the Institute's Rocky Mountain Laboratory studies the insect-borne diseases which are transmissible from animals to man. Examples of such diseases are tularemia, plague, Q fever, and relapsing fever.

The research problems on which the Institute's four laboratories and its field stations are now working include studies on diseases such as hepatitis and malaria, initiated at the request of the armed services and financed with their

funds. The Microbiological Institute is also responsible for stimulating and supporting research through grants-in-aid given to scientists in the Nation's universities, hospitals, and other qualified nongovernmental research institutions.

Greatest Disease Source of Absenteeism

Although in past decades the diseases caused by microorganisms were significant in terms of death rate and disabling illness, their overriding importance today derives from their significance in terms of aggregate illness and economic loss. Infectious and parasitic diseases currently cause more people to be absent from productive effort--whether at work, at school, or at home--than any other disease factor. Therefore, to the extent that a productive nation must of necessity be a healthy nation, research in this field must be pursued constantly to improve and to maintain the general public health. Existing gains must be maintained and, at the same time, gaps must be filled in neglected areas.

Because of the short-term nature of many infectious diseases, it is expected that Clinical Center patients whose ailments are being investigated by the Microbiological Institute will be drawn principally from States adjacent to the Washington area.

Combined Approach Yielding Results

Concerning the direction of future research, it can be said that the combined laboratory-epidemiological approach to disease problems, which has yielded promising results in recent

years, will continue to be used in connection with diseases against which science has made little progress. This approach was employed successfully, for example, in the Norfolk, Virginia, communicable disease study, in which it was shown that whooping cough vaccine and diphtheria toxoid, mixed together, provide better diphtheria immunity than diphtheria toxoid alone. During the past year, the Norfolk study was broadened to include epidemiological investigations of influenza and to test influenza vaccines. These studies of entire population groups have likewise greatly extended present knowledge of the Coxsackie viruses, a new family of organisms which have been definitely linked to herpangina, a widely prevalent childhood disease, and to epidemic pleurodynia, or "Devil's Grippe," a condition characterized by high fever and severe chest and abdominal pains.

A simple, inexpensive diagnostic test which can be performed without special equipment or specially trained technicians would greatly facilitate control of many infectious and parasitic diseases. This is particularly true in many undeveloped areas of the world where medical resources are limited and parasitic diseases a staggering burden. To meet this need, Microbiological Institute scientists have developed a new diagnostic test which has proved sensitive thus far against a number of diseases such as filariasis, tularemia, and trichinosis. Work with this test is continuing.

Much remains to be learned in many branches of microbiology. Against some diseases there are as yet no

adequate immunizing measures; against others there is no satisfactory treatment. Even the broad advances in medicine credited to the antibiotic drugs and to the use of blood and its various fractions have brought with them new and challenging problems. An integrated attack on many of these problems will be aided by the Clinical Center's unified approach to basic and clinical research.

To expand the nation's research potential in problems of defense importance, the Microbiological Institute has been given responsibility for the scientific direction and administration of the Sectional Research Program, which is part of the grants-in-aid program of the National Institutes of Health. This project is of particular significance to biological warfare defense. One of its objectives is more rapid identification of disease agents which might be employed in waging biological warfare.

NATIONAL INSTITUTE OF NEUROLOGICAL DISEASES AND BLINDNESS

The National Institute of Neurological Diseases and Blindness was established in August 1950 by Public Law 692. By this law this Institute is authorized to attack such major health problems as cerebral palsy, epilepsy, multiple sclerosis, muscular dystrophy, the crippling effects of poliomyelitis, and those disturbances which cause blindness and deafness.

These and other neurological and sensory disorders affect from 15 to 20 million persons in the United States. They are third among the causes of death and first among all causes of permanent disability. For most of these disturbances the causes are unknown and no specific treatment is available.

Many Organizations for Federal Aid

The establishement of the National Institute of Neurological Diseases and Blindness represented the culmination of several years of organized effort by individuals, voluntary health agencies and professional societies to have Congress establish separate institutes for the separate disorders in which they were interested. Prior to 1950, such agencies as the National Multiple Sclerosis Society, the United Cerebral Palsy Associations, the National Council to Combat Blindness, the National Society for Crippled Children and Adults and the American Muscular Dystrophy Associations had presented to Congress more than a dozen bills for that purpose. In 1951, four more such bills were introduced in the Senate. The NINDB did not receive operating funds until fiscal year 1952, however,

at which time it was allocated $1,189,580, under the general heading "Operating Expenses, National Institutes of Health." For fiscal year 1953, Congress made $1,427,521 available.

Under these appropriations, the Institute has been able to organize a limited program patterned on those of the older Institutes. These programs include research grants and fellowships, a traineeship program whereby qualified medical personnel can receive short-term training in rehabilitation at qualified centers, and finally an intramural research program.

Grants Bolster Research In Many Fields

By far the largest proportion of funds ($1,015,000 in 1953) is devoted to research grants. This program has permitted the government to bolster research significantly in certain areas that had been virtually neglected. For example, the $293,000 spent by this Institute to support research on the eye and on eye disorders represents almost a third of all ophthalmological research being done in the entire country. Similarly, broad extension of the work on multiple sclerosis and epilepsy has been achieved through the grants program, and useful research findings have already been used, although this program is relatively new.

A new drug has been found, for example, which intensifies the action of other drugs already found useful for epilepsy; a new surgical procedure has been devised for the relief of experimental hydrocephalus in dogs which may finally find application to children suffering and dying from this disorder;

and a method has recently been developed for transplanting corneas of the eye so that they do not cloud.

These and other fields of research, however, have to be expanded considerably. The Institute especially looks forward to increasing the support of investigations on cerebral palsy, muscular dystrophy, parkinsonism, migraine, neuralgia, neuritis, and those disturbances or diseases which cause deafness. These disorders can now receive only minor research attention.

Ophthalmology Research Vital

The Institute also looks forward to developing research manpower in the fields of ophthalmology and neurology. At the present time, less than half of the seventy-eight medical schools in the country have active departments of neurology, thereby limiting not only the number of practicing neurologists (there are fewer than 500 in the Nation) but also the number of investigators in the field. This problem could be partially eliminated through grants to medical schools for either the initiation or expansion of their departments of neurology. Increased support of promising research students in both fields also should be made through the fellowships program. The research potential in the field of ophthalmology, for example, has scarcely begun to be realized. There are only two biochemists working in this field and a handful of biophysicists.

Limited as the Institute's program is, small as non-Federal programs are in neurology and ophthalmology, there is

promise of progress in the relatively near future. In the past decade, research has begun to challenge significantly the complexities of the central nervous system. With the many leads that have been developed during this short period, it is foreseeable that within the next ten years some of these incurable, untreatable disabling disorders will finally become responsive to medical therapy.

THE NATIONAL INSTITUTE OF DENTAL RESEARCH

The National Dental Research Act, approved June 24, 1948, established within the Public Health Service a National Institute of Dental Research, occupying a position similar to that of the other Institutes.

The Act authorizes the Surgeon General to conduct researches relating to dental diseases and conditions; to coordinate research in the Institute with similar researches conducted by other agencies, organizations, and individuals; to provide fellowships in the Institute, and to secure for the Institute consultation services and advice of persons here or from abroad who are experts in the field of dental diseases and conditions; to cooperate with State health agencies; and to provide training and instruction in matters relating to the diagnosis, prevention, and treatment of dental diseases and conditions.

The Act also creates a National Advisory Dental Research Council to consist of the Surgeon General, the Chief Medical Officer of the Veteran's Administration, the Surgeon General of the Army, the Surgeon General of the Navy, or their representatives, and twelve members appointed by the Surgeon General with the approval of the Federal Security Administrator. This Council is authorized to review research projects; to collect information on studies being made on dental diseases and make such information available through

appropriate channels; review applications for grants-in-aid.

The American Dental Association furnishes conditional gift funds to the National Institute of Dental Research which provide the salaries of fellows working with the Institute on their research projects. Organizations that have adopted favorable policies respecting fluoridation include the American Dental Association, the American Medical Association, the American Public Health Association, the American Water Works Association, and the American Association of Public Health Dentists.

Appropriations for the Dental Institute have been as follows: 1949, $429,751; 1950, $571,280; 1951, $691,500; 1952, $691,154.

Exploring With Electron Microscope

In addition to the extensive studies of the fluorides in relation to the prevention of dental caries, dental researchers are exploring the organic framework of enamel and dentine with the electron microscope; studying the organic components of saliva, and the reaction of teeth to various chemical agents; studying and classifying the lactobacilli (the acid-forming bacteria of the mouth); and investigating the relation of oral bacterial metabolism to dental caries.

The public is well aware of the need for more expanded dental research. Dental disease is the most widespread disease in the Nation. It is expensive, causes suffering and loss of man hours, and frequently produces or aggravates

other serious body ailments. In municipalities where fluoridation of the public water supplies has been adopted, people have shown that they favor it 10 to 1. Today, many of the objections to fluoridation which have been voiced in the past through ignorance of its efficacy have been erased by demonstrations and education. There is no basis for the fear that fluorine in the water supply is harmful to humans. Extensive research has established its safeness, and more communities each year are fluoridating their public water supplies.

Unmatched Research Opportunities

The National Institute of Dental Research has a 20-chair clinical laboratory in the Clinical Center. This presents opportunities for inauguration of a clinical research program in dental research. This opportunity is unmatched elsewhere in the country. The dental research on patients in the Clinical Center constitutes an integral part of the research being conducted by other Institutes. Techniques have been perfected for isolating certain oral organisms and cultivating them for the first time outside the body. It is planned to adopt these techniques to clinical research at the Clinical Center. Some studies on the value of different antibiotics in preventing tooth decay are ready for clinical trial. The advantages of combining clinical research with basic dental research cannot be overemphasized.

The National Institute of Dental Research will continue its extensive researches in fluoridation and will continue to

work toward a better understanding of the normal structure of teeth and the various factors which may determine tooth pathology. Intensified research in the highly important field of diseases of the gums will be an integral part of the program. The fluoridation of the Montgomery County water supply by the Suburban Sanitary Commission has placed the laboratory facilities of the Dental Institute in close proximity to a fluoridation project for special studies. Investigations into the role played by certain nutritional factors in tooth decay and periodontal diseases; the value of antibiotics in preventing tooth decay; electron microscope studies of the basic structure of dental tissues; and the structural alterations which result in malformation and disease constitute but a portion of the future research plans of the Dental Institute.